1.

$x^3 - 4x^2 - 3x + 18 = (x+a)(x-b)^2$ for all x.

Find the values of a and b.

2.

$x^4 + 8x^3 + 2x + 16 = (x^3 + a)(x+b)$ for all x.

Find the values of a and b.

3. Prove that $(x-y)(x+y) \equiv x^2 - y^2$ for all values of x

4. Prove that $x^2 + 8x + 20 \geq 4$ for all values of x

5.

Determine the value of each of the constants P, Q and R in the identity

$$P(x+1)^2 + Qx(x+1) + Rx \equiv 1.$$

6.

Determine the value of each of the constants p and q in the identity

$$(2x+p)(6x^2 - 7x + 2) \equiv (4x^2 - 1)(3x + q).$$

7. Prove that

a) $$\frac{3x-4}{x+1} - \frac{2x^2 - 12x}{x^2 - 1} \equiv \frac{x+4}{x-1}$$

Hint: start with the left-hand side. Factorise the denominator of the second fraction. Write it as a single fraction with a

8. Prove that

a) $$\frac{2}{x-1} + \frac{x-11}{x^2 + 3x - 4} \equiv \frac{3}{x+4}$$

Answers

1. $\boxed{a=2, b=3}$

2. $\boxed{a=2, b=8}$

3. LHS: $(x-y)(x+y)=x^2+xy-xy-y^2$

   ¿ $x^2-y^2=$ ¿ RHS as required

4. $x^2+8x+20\geq 4$

$x^2+8x+16\geq 0$

$x^2+8x+16=(x+4)^2-16+16$

¿ $(x+4)^2$

$(x+4)^2\geq 0$ since any number squared is ≥ 0

Hence $x^2+8x+20\geq 4$ for all values of x

5.

$\boxed{P=1}$, $\boxed{Q=-1}$, $\boxed{R=-1}$

6.

$\boxed{p=1}$, $\boxed{q=-2}$

7.

(a) $\frac{3x-4}{x+1}-\frac{2x^2-12x}{x^2-1}=\frac{3x-4}{x+1}-\frac{2x^2-12x}{(x+1)(x-1)}=\frac{(3x-4)(x-1)-(2x^2-12x)}{(x+1)(x-1)}$

$=\frac{3x^2-7x+4-2x^2+12x}{(x+1)(x-1)}=\frac{x^2+5x+4}{(x+1)(x-1)}=\frac{(x+4)\cancel{(x+1)}}{\cancel{(x+1)}(x-1)}=\frac{x+4}{x-1}$ //

8.

(a) $\frac{2}{x-1}+\frac{x-11}{x^2+3x-4}=\frac{2}{x-1}+\frac{x-11}{(x-1)(x+4)}=\frac{2(x+4)+(x-11)}{(x-1)(x+4)}$

$=\frac{2x+8+x-11}{(x-1)(x+4)}=\frac{3x-3}{(x-1)(x+4)}=\frac{3\cancel{(x-1)}}{\cancel{(x-1)}(x+4)}=\frac{3}{x+4}$ //